Breaking down protein degradation mechanisms in cardiac muscle.

Journal: Trends Mol Med

Publication Year: 2013

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PubMed link: 23453282

Funding Grants: Molecular Mechanisms Underlying Human Cardiac Cell Junction Maturation and Disease Using Human iPSC

Public Summary:
The removal of damaged or unwanted proteins from cardiac muscle cells is essential to maintain optimal heart function. Removal of these “junk” proteins occurs at specific locations within cardiac muscle cells, including cell-cell junctions, and requires the action of certain enzymes that reside within these cellular compartments. When these enzymes relocate to other regions within the cell and continue the removal process, irregular protein turnover occurs which can disrupt cellular function. Here we discuss the role that the relocation of protein removal enzymes plays in the development of cardiac diseases, and the potential for targeting these enzymes as a therapeutic approach for cardiac disease.

Scientific Abstract:
Regulated protein degradation through the ubiquitin-proteasome and lysosomal/autophagy systems is critical for homeostatic protein turnover in cardiac muscle and for proper cardiac function. The discovery of muscle-specific components in these systems has illuminated how aberrations in their levels are pivotal to the development of cardiac stress and disease. New evidence suggests that equal importance in disease development should be given to ubiquitously expressed degradation components. These are compartmentalized within cardiac muscles and, when mislocalized, can be critical in the development of specific cardiac diseases. Here, we discuss how alterations in the compartmentalization of degradation components affect disease states, the tools available to investigate these mechanisms, as well as recent discoveries that highlight the therapeutic value of targeting these pathways in disease.